Prevalence, Reasons and Relative Risk Factors for Tooth Extraction in a Tertiary Care Hospital, Pakistan

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Abstract

Objective: The aim of this study is to identify the cause and pattern of tooth extraction and its relative risk factors in our local population.

Study Design and Settings: This Cross-sectional study was performed in Department of Oral Surgery, Sir Syed Medical and Dental Hospital, Pakistan.

Methodology: Hundred and twenty participants were taken, placed on the incorporation and exception standards. These included the patients who reported in the out patient department of Oral Surgery, Sir Syed Medical and Dental Hospital, Karachi, Pakistan. Six months cross-sectional study was performed, from 1st January, 2019 to 31st December, 2019. Following the selection criteria, a number of 242 patients were selected with the age ranging from 15 years to 65 years. A detailed history was acquired from every patient, comprising of age of patient, gender of patient, systemic history etc. After thorough history and examination, following information was recorded in a proforma; age, sex, type of tooth extracted, purpose for extracting the tooth (caries, periodontal disease, trauma, orthodontics, pericoronitis, impactions, prosthesis, supernumerary teeth and failed root canal treatment), relative risk factors (uncontrolled diabetes mellitus, smokers).

Results: A total number of 242 patients underwent extraction of tooth in our study and 1149 dental extractions were performed in a period of 6 months. The average age of participants was ± 63.3 with a male predilection of 56.1% (136 patients). Most commonly extracted tooth was molar. Most common reason of tooth extraction were caries 592 teeth (51.5%), followed by periodontal diseases 411 teeth (35.7%), endodontic issues 81 teeth (7%), prosthetic reasons 35 teeth (3.5%) and due to previous treatment 30 teeth (2.6%). For relative risk factors: 69 patients (28.5%) were smokers and 56 patients (23.1%) were known diabetic. Both relative risk factors were present in 14 patients (5.7%).

Conclusion: Dental extractions were more common in males. Overall, the usual purpose of extracting the tooth was dental cavity. In younger age group, dental caries was the cause of tooth extraction predominantly and in elderly, periodontal diseases were the commonest causes of tooth extraction. Diabetes was a major risk factor for extractions. Good oral hygiene measures and better diabetic control can reduce the incidence of tooth extractions.

Keywords: Tooth Extraction; Relative Risk Factors; Dental Caries; Periodontal Diseases

Introduction

Tooth loss is a major health issue throughout the world[1]. Loss of teeth can result in difficulty in chewing of food, speech problems, esthetic issues and psychiatric problems [1]. This is an essential indicator of oral hygiene and can prognosticate other underlying problems also [2].

Reasons of tooth extraction can vary from caries, periodontal disease, trauma, orthodontic reasons and pericoronitis, to other reasons such as impactions, root canal failure, prosthodontics requirements and super-numerary teeth [1-10].

With recent advancements in preventive dentistry, awareness campaigns in schools, advertisement campaigns in media, new cost effective health insurance policies, trends of water fluoridation and other preventive measures such as use of fluoridated tooth paste and development of local applications for fluoride gels, have reduced the incidence of tooth extractions [2]. Moreover, all the above mentioned factors have also made periodontal diseases as one of the predominant causative factors, compared to dental caries [2-5].

Certain risk factors have been associated with tooth loss [2,5]. These include poor oral hygiene measures, uncontrolled diabetes mellitus, smoking and a low socio economic status [2,5]. Population with low socio economic status has higher prevalence and extent of teeth mortality [5-7]. Puffing of tobacco is also a major threat for periodontal diseases [10]. Uncontrolled diabetes mellitus leads to gingivitis and periodontitis, which ends up in tooth loss [11-16]. Poor oral hygiene measures can lead to decaying of tooth and more periodontally compromised teeth [16-25].

Previous studies have also reported a male predilection (55.8%) with a mean age range of 23 to 91 years. A total of 27% had puffing tobacco habits and 22.5% were influenced by controlled diabetes. Around 6% had smoking habits and diabetes. Molars were the most commonly extracted teeth (37.9%) and the canines were least extracted. Caries and compromised periodontal health were the major reasons of loss of teeth, with 52.2% lost due to carious lesions and 35.7% lost because of periodontal diseases. Only 7% were lost due to endodontic issues while 2.9% were pulled out for prosthetic indications and 2% were missed because of failure of past dental interventions [2]. According to previous study, diabetic patients with compromised periodontal health had more frequency of dental extractions as compared with non-diabetic patients whereas there was no statistically difference was found among non-smokers and smokers in association with the pattern of tooth extraction. Out of 44 extracted teeth among patients with history of smoking and diabetes, major reasons were periodontal disease and dental caries in 50% and 44% of extractions respectively while there was no significant differences were found among non-smokers and non-diabetics. Around 48% of all extracted teeth, incisors with compromised periodontal health were most commonly extracted.

Objective of the Study

The objective of this study is to determine the cause and pattern of tooth extraction and its relative risk factors in our local population. By identifying the reasons and risk factors for tooth extraction we can endeavor to limit the future extractions of teeth by overcoming the causes of tooth loss. Moreover, we can successfully highlight the role of preventive measures in tooth loss. Effective media campaigns, addition of brushing instructions in school syllabus and developing good quality fluoridated tooth paste can be done by successfully identifying the causes of tooth extraction. A baseline data can be obtained for future studies, to be conducted on the same subject. Lastly, commonest causes of tooth extraction can be identified for our local population, which may or may not be in accordance to the international studies, this can more effectively channel the health resources for prevention of identified causes of tooth extraction.

Methodology

Two hundred and forty two patients were selected, based on inclusion and exclusion criteria. These were the participants who reported in the Oral Surgery department, Sir Syed Medical and Dental Hospital, Karachi, Pakistan. One year cross-sectional study was per-

formed, from 1st January, 2019 to 31st December, 2019. The inclusion criteria followed in the study encompassed; patients belonging to age range 15 to 65 years and any gender, who were willing to participate in the study and underwent dental extraction under local anesthesia. Patients excluded from this study were; immune-compromised patients; diabetics, chronic renal failure patients, disorders which involve facial skeleton, mentally retarded patients; extraction requiring general anesthesia, patients who had undergone radiation and chemotherapy and pregnant patients.

After obtaining institutional ethical approval letter, a trans-sectional study was carried out for a span of 12 months from 1st January 2019 to 31st December 2019. All study subjects were asked for informed consent. According to the selection criteria, a number of 242 participants were selected aged from 15 years to 65 years. A detailed history was acquired from every patient, comprising of age of patient, gender of patient, systemic history etc. After thorough history and examination, following information was recorded in a proforma; age, sex, type of tooth extracted, purpose for extracting the tooth (caries, periodontal disease, trauma, orthodontics, pericoronitis, impactions, prosthesis, supernumerary teeth and failed root canal treatment), relative risk factors (uncontrolled diabetes mellitus, smokers). Periodontal health of teeth was evaluated by simplified oral health index and Millard's index.

These clinical findings were correlated with radiological investigations. Orthopentamogram (OPG) was performed. It may also be used to confirm the diagnosis, exclude pre-existing pathologies and for making a comprehensive treatment plan.

Data analysis

Statistical Package for Social Sciences (SPSS) version 21 was used for the entry of the collected data. Mean and standard deviation were calculated for quantitative variables: age of patients. Prevalence and proportion were calculated for qualitative variables; type of tooth extracted, reason for tooth extraction, relative risk factor (diabetes and smoking) and gender of patient. Both groups were compared for most common reasons of tooth extraction (dental caries or periodontal diseases) and for relative risk factors (diabetes and smoking). Chi square test was used for analysis of comparison of two age groups with causes of extraction (dental caries or periodontal diseases), and to analyze the comparison of reasons of tooth extraction (dental caries or periodontal diseases) with the relative risk factors (diabetes and smoking) with a value of $P < 0.05$ considered as significant.

Results

A sum of 242 patients underwent extraction of tooth in our study and 1149 dental extractions were performed in a period of 1 year. The mean age of patients was ± 62.4 with a male predilection of 56.1% (136 patients). Most commonly extracted tooth was molar. Most common reason of tooth extraction were caries 592 teeth 51.5%, followed by periodontal diseases 411 teeth (35.7%), endodontic issues 81 teeth (7%), prosthetic reasons 35 teeth (3%) and due to previous treatment 30 teeth (2.6%) (Figure 1). For relative risk factors: 69 patients (28.5%) were smokers and 56 patients (23.1%) were known diabetic. Both relative risk factors were present in 14 patients (5.7%).

Comparison of reasons of tooth extraction (dental caries or periodontal diseases) was made with the relative risk factors for tooth extractions (diabetes and smoking). Out of 411 teeth extracted due to periodontal disease, 309 (34.4%) were in non-diabetic patients and 102 (42%) were in diabetic patients. Hence diabetes was a significant relative risk factor for tooth extractions made due to periodontal diseases. Out of 411 teeth extracted due to periodontal diseases, 248 (36.4%) were in non-smokers and 163 (34.7%) were in smokers. This is statistically non-significant, hence no correlation between periodontal diseases and smoking could be established (Table 1). Teeth extracted due to prosthodontic reasons, endodontic lesions and failed previous treatment 0.8%, 2.3% and 3.1% respectively in diabetic patients. This shows a statistically significant relationship between diabetes, as a risk factor, and tooth extraction (Table 1). Teeth extracted due to prosthodontic reasons, endodontic lesions and failed previous treatment 3.8%, 7% and 1.2% respectively in smokers. This shows statistically a non-significant relationship between smoking, as a risk factor and tooth extraction (Table 1).

Causes of tooth loss	Total extracted teeth n = 1149	Extracted teeth in non-diabetic patients n = 897	Extracted teeth in diabetic patients n = 252	P-value	Extracted teeth in non smoker n = 680	Extracted teeth in smoker n = 469	P-value
Caries	592 (51.5%)	459 (51.1%)	133 (52.7%)		343 (50.4%)	249 (53%)	
Periodontitis	411 (35.7%)	309 (34.4%)	102 (42%)		248 (36.4%)	163 (34.7%)	
Prosthodontic indication	35 (3%)	32 (3.5%)	2 (0.8%)	0.003*	17 (2.5%)	18 (3.8%)	0.10
Endodontic lesion	81 (7%)	75 (8.3%)	6 (2.3%)		48 (7%)	33 (7.0%)	
Failure of root canal Treatment	30 (2.6%)	22 (2.4%)	8 (3.1%)		24 (3.5%)	6 (1.2%)	

Table 1: Overall comparison of tooth extraction causes among non-diabetic, diabetic, non-smoker and smokers.
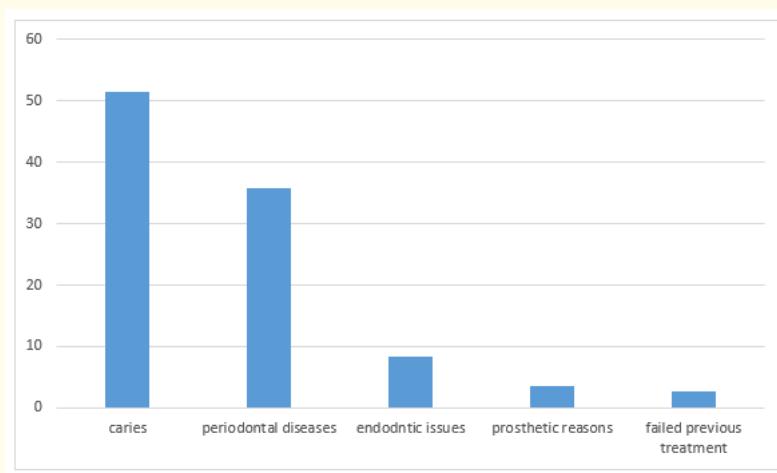**: Statistically significant.*

Figure 1: Distribution of tooth extraction causes among all patients.

Discussion

Khalil., *et al*. [1] reported greatest proportion of tooth extraction in young females aged 10 to 30 years. Cavities was seen to be the prime purpose for extraction (50.2%) along with orthodontic problems (18.2%), eruption problems (17.5%) and periodontal problems (8.2%). The 3rd mandibular molar was the most frequently extracted tooth (19.4%), the 3rd maxillary molar (16.4%), the first maxillary pre-molar (13.2%) and the first mandibular molar (10.9%). These findings are contrary to our results which indicated a male predominance. The mandibular 1st molar was most frequently extracted tooth, along with maxillary first molar.

A more comprehensive cohort study was performed by Passereli., *et al.* [2] in Italy. He conducted this study on a total of 120 patients. the mean age range was 63.3 with a male predominance (55.8%). Time duration of the study was 6 months in which 554 teeth were

extracted. Molar was the most common tooth extracted. Out of 120 patients, 33 patients (27.5%) were smokers and 27 patients (22.5%) were suffering from diabetes mellitus. Patients suffering from diabetes and also had a habit of smoking, were 5 patients (5.8%). The most common reason for extraction was dental caries; 289 teeth (52.2%), followed by periodontal diseases; 198 patients (35.7%), endodontic issues; 38 teeth (6.9%), prosthetic reasons; 16 (2.9%) and previous treatment; 13 patients (2.2%). Out of the 198 teeth due to periodontal diseases were extracted, 146 teeth were extracted from diabetic patients and 52 teeth were extracted from non diabetic patients. this indicates a significant association between periodontal diseases and diabetes mellitus. Similarly, out of the 198 teeth extracted due to periodontal diseases, 36% were non smokers and 35% were smokers. This shows a non significant association between periodontal diseases and smoking habits. These findings support our results, which we concluded in our study, performed on our local population.

Another study conducted Abdul Razaq., *et al*. [3] in Nigeria, performed on a total of 984 patients, reported an age range of 21 to 30 years to be the most common age group for tooth loss. Dental caries was the prime cause for tooth loss (631 teeth, 54.1%) followed by periodontal diseases (192, 16.5%) there was a male predilection with a male to female ratio of 1.1:1. Mandibular teeth were most commonly extracted than maxillary teeth, representing 703 teeth (60.2%) and 464 teeth (39.8%), respectively. Most commonly extracted tooth was mandibular molar; 780 teeth; 66.8% and least extracted tooth was canines; 26 teeth; 2.2%. Over all, most commonly extracted tooth was mandibular left 3rd molar. These findings also correspond to our results, except that we identified mandibular 1st molar as the commonest tooth extracted, during our study.

A study conducted by Nuvvula., *et al*. [4] conducted on 502 patients reported 1055 tooth extractions. The major cause of extraction was dental caries (51.14%) in age groups of 20 to 30 years, which is high in comparison to loss of teeth due to periodontal diseases in this age bracket, whereas in case of > 40 years of age group periodontal diseases account for 54.11% and cavities were found to be only 29.11%, showing more teeth were lost due to periodontal diseases. These findings also correlated with our results.

Study conducted by Haseeb., *et al*. [5] in a tertiary care centre of Pakistan concluded a mean age of presentation to be 46.60 years. A total of 1178 extractions were performed. Advanced dental caries was the leading cause of tooth extraction in 63.1% patients, followed by periodontitis in 26.2% patients. the predominant reason of tooth of extraction in all age groups was dental caries. These results, to some extent, correlates with our findings as we also concluded that dental caries as predominant cause of tooth extraction in group-I.

A Spanish study conducted by Medina-Solis., *et al*. [6] was performed on 331 subjects. The main purpose of dental extraction was caries (43.1%), periodontal disease (27.9%) and prosthetic reasons (21.5%). There were no significant gender predilections. Extractions due to periodontal diseases were common in older age groups. For teeth, upper, posterior, and molars were extracted primarily because of caries, while lower, anterior and incisors were more often extracted because of periodontal diseases.

Montandon., *et al*. [7] indicates a trend of dental extractions in younger patients is due to caries and periodontal diseases to be the frequent reason of dental extractions in older age population. Moreover, dental caries and periodontal diseases were the main causes of teeth extractions. Anterior teeth loss increased with age, molar and premolar extractions were common in younger age patients.

Jafarian., *et al*. [8] looked for the causes for permanent teeth extractions in general dental practices in Tehran, Iran. They concluded a male predominance in extractions of teeth. The frequent cause of extraction was dental caries 51%, while periodontal diseases accounted for 14.4%. presence of caries was the main cause of tooth extraction in young patients while periodontal disease was the commonest cause of tooth extraction in older age group. Most frequently extracted teeth were lower 3rd molars (18%), followed by pre molars (14.7%), while lower canines were the least extracted teeth. Premolars were mostly extracted due to dental caries. Incisors were mostly extracted due to periodontal diseases.

Nikolaos., *et al*. [9] conducted research work on the same topic in Greece. He concluded dental caries as the most common cause of dental extractions (45.6%) followed by periodontal diseases (32.1%). Presence of Caries was the major reason of extracting teeth in age

group greater than 44 years old while periodontal diseases were the commonest cause of extracting teeth in age group above 44 years old. The commonest teeth to be extracted due to dental caries were molars. Mandibular pre molars and maxillary and mandibular anterior teeth were mostly extracted due to periodontal diseases.

In studies over the last three decades; Spyros., *et al*. [13], Nasruddin., *et al*. [14], Nico., *et al*. [16], Corbet., *et al*. [25], similar trends have been reported. Caries have been the prime cause of tooth extraction in human race. In this study, the number of dental extractions was found to be highest in males than females.

Conclusion

Overall, the main cause of tooth extraction was cavities. In group of younger age, caries were the reason of extracting the tooth predominantly and in older group, periodontal diseases were the commonest reasons of extracting the tooth. Diabetes was a major risk factor for extractions. Good oral hygiene measures and better diabetic control can reduce the incidence of tooth extractions.

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